

High Resolution Urban Air Quality Modelling – Leipzig Case Study

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The objective of this modeling study is to improve our understanding of the budget of short-lived climate forcers and key air pollutants across large urban areas. A special focus is on the influence of cities as local heat source (island effect) and primary emission source of short-lived air pollutants from traffic. The urban impact on airflow and radiation budget will be evaluated for the City of Leipzig using high-resolution atmospheric simulations with grid spacings on the order of 100 m. The simulations will be performed with the COSMO model enhanced by a state-of-the-art building effect parameterization. The dispersion and transformation of air pollutants in the urban environment will then be investigated with the multiscale chemistry-transport model MUSCAT coupled to the urbanized COSMO. Ultimately, this research aims to gain insight into the feedbacks between pollutant emissions, air quality, and climate.

Fine grain air quality and meteorological sensor networks are a promising tool to evaluate and initialize such model simulations. In order to investigate the applicability, a sensor measurement test site will be installed in a city quarter of Leipzig aiming for less than 200m distance between two sensor devices.